

## CLAIMS

1. A network element (1) for setting up wireless networks (3) for wireless data exchange between network elements (1) and/or network users (2), wherein the network element (1) has a transmitting/receiving unit (12) for wirelessly transmitting and receiving data, a control unit (11) for controlling the processing of data and a data memory (15),

characterised in that the control unit (11) is adapted to evaluate connection path information (22) and connection state information (21) for data exchange between network elements (1) and/or network users (2) in order to determine partial sections of data transmission routes and/or complete data transmission routes for transmitting or forwarding data, wherein the connection path information (22) specifies the number of the network elements (1) and the neighbourhood relationships of the network elements (1) of the network and the connection state information (21) specifies the state of the connection between network elements (1) and/or network users (2).

2. A network element as set forth in claim 1

characterised in that the control unit (11) is adapted to evaluate connection state information (21) and connection path information (22) stored in the data memory (15) and/or connection state information (21) and connection path information (22) contained in the data intended for the data exchange.

3. A network element as set forth in claim 1 or claim 2

characterised in that the connection path information (22) stored in the data memory (15) specifies the number of the network elements (1) and the neighbourhood relationships of the network elements (1) of the entire network (3) and the connection state information (21) specifies the state of the connection between network elements (1) and/or network users (2) of the entire network (3).

4. A network element as set forth in one of the preceding claims characterised in that the data memory (15) is adapted for storage of an item of authentication information (23) which is present only a single time for each network element (1) and the control unit (11) is adapted to transmit the authentication information (23) by means of the transmitting/receiving units (12) to other network elements (1) and to evaluate the items of authentication information (23) received from other network elements (1) for checking the entitlement of the other network elements (1) of the network for data exchange in the network (3).

5. A network element as set forth in one of the preceding claims characterised in that the data memory (15) is adapted for the storage of an item of authorisation information (24) which is unique in the network, in particular an item of address information, which is characterising in respect of each network user (2) and each network element (1) in the network, and the control unit (11) is adapted to transmit the authorisation information (24) by means of the transmitting/receiving units (12) to other network elements (1) and to evaluate the authorisation information (24) received from other network elements (1) to determine at least partial sections of data transmission routes in the network (3).

6. A network element as set forth in one of the preceding claims characterised by a first transmitting/receiving unit (12) for the data exchange of network elements (1) with each other and a second transmitting/receiving unit (12) for data exchange between network elements (1) and network users (2).

7. A network element as set forth in one of the preceding claims characterised by coupling means (202, 203) for coupling the network element (1) for data exchange with a second network (4), in particular a non-wireless infrastructure network like the Internet.

8. A network element as set forth in one of the preceding claims

characterised by coupling means (204) for coupling of the network element (1) to a plurality of different energy sources, in particular solar cells.

9. A network element as set forth in claim 7

characterised in that the coupling means (202, 203) for data exchange are adapted also to supply the network element (1) with energy by means of the coupling means (202, 203) for data exchange, in particular by means of an Ethernet connection (202) for a non-wireless infrastructure network (4).

10. A network element as set forth in one of the preceding claims

characterised by at least one transmitting/receiving unit (12) in accordance with one or more of the standards IEEE 802.11a, IEEE 802.11b and IEEE 802.11g.

11. A network element as set forth in one of the preceding claims

characterised in that it has one or more WLAN PCI-cards (300) in accordance with one or more of the standards IEEE 802.11a, IEEE 802.11b and IEEE 802.11g, volatile and non-volatile memories (103, 105), in particular SDRAMs or flash memories, a microprocessor or microcomputer unit and/or programmable logic components (100, 101, 102), for regulating and controlling power loss and the energy sources and two antennae respectively for data of network users (2) and network elements (1).

12. A method of setting up wireless networks (3) for data exchange between network elements (1) and/or network users (2) comprising the steps:

- exchanging and storing connection path information (22) and connection state information (21) of the network elements (1) relative to each other and of the network users (2) relative to the network elements (1),

- evaluating the connection path information (22) and connection state information (21),
- exchanging data between network elements (1) and/or network users (2) based on the items of connection path information (22) and items of connection state information (21), by despatching data through a first network user (2) to a network element (1) arranged in the proximity, and
- receiving the data through the network element (1) and further despatching the data in relation to an adjacent network element (1) in a direction towards the addressed second network user (2) or the addressed network user (2) itself by way of a data transmission route ascertained (21, 22) from the connection state and connection path information or a partial section of a data transmission route.

13. A method as set forth in claim 12

characterised by finding network elements (1) and network users (2) by wirelessly receiving and emitting connection enquiries.

14. A method as set forth in claim 12 or claim 13

characterised by checking the authenticity of the found network elements (1) by evaluation of a sent item of authenticity information (12) for ascertaining the entitlement for data exchange and storage of the entitlement information ascertained therefrom.

15. A method as set forth in one of claims 12 and 14

characterised by the steps of transmitting, receiving, allocating and storing in the network unique authorisation information (24), in particular address information of network elements (1) and network users (2).

16. A method as set forth in claim 15

characterised by handing over network users (2) from the transmitting/receiving region (7) of a first network element (1) into the transmitting/receiving region (7) of a second network element (1) in dependence on the connection state information (21) and the connection

path information (22) while retaining the unique authorisation information (24) associated with the network user (2).

17. A method as set forth in one of claims 12 through 16 characterised by adding network element (1) to the transmitting/receiving region (7) of network elements (1) already arranged in the network (3).

18. A method as set forth in one of claims 12 through 17 characterised by distinguishing and separating the wireless data exchange in accordance with network users (3) and network elements (1), in particular by using different frequency ranges, allotting frequency channels, time multiplexing and/or different modulation methods and/or standards of wireless data transmission for data exchange between network users (2) and data exchange only between network elements (1).

19. A method as set forth in one of claims 12 through 18 characterised by coupling a plurality of network elements (1) to a second network (4), in particular a non-wireless infrastructure network like the Internet.

20. A method as set forth in one of claims 12 through 19 characterised by

- provision of a predefined limited number of items of authorisation information (24) for network users (2), which is the same in all network elements (1),
- the detection of an association event by a network element (1), which indicates that a network user (2) is within the transmission/reception range of a network element (1),
- comparison of the communicated authorisation information (24) with the predefined known items of authorisation information (24),
- evaluation of the comparison to ascertain whether this is an external network user (2) or a network user who is already known,

- assignment of an item of authorisation information (24) when an external network user (2) has been ascertained,
- communicating the connection path and/or connection state information (21, 22) related to the network user (2) to the network elements (1) of the network, and
- communicating an item of authorisation information to the network user, which is characteristic of the network, in particular address information for data transmission.

21. A network having network elements (1) as set forth in one of claims 1 through 11 for setting up wireless networks (3) for network users (2) according to a method as set forth in one of claims 12 through 19, wherein the data exchange between two or more network users (2) is always effected at least by means of a network element (1) and on the basis of the connection state and the connection path information (21, 22).

22. A network as set forth in claim 21  
characterised in that the spatial distance of the network elements (1) is substantially less than the range of the transmitting/receiving units (12, 7) of the network elements.

23. A network as set forth in one of claims 21 and 22  
characterised in that inter-related data can be stored distributedly in the data memories (15) of a plurality of network elements (1).